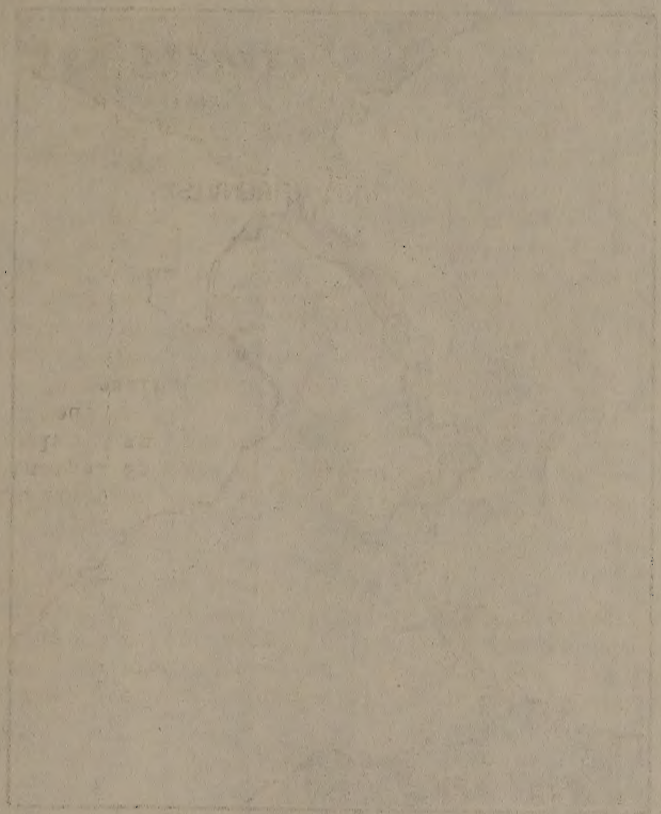
361. A2F4
.390

FISHERY RESOURCES OF TURKEY

APR 26 1951
LIBRARY
FISH & WILDLIFE SERVICE
PACIFIC OCEANIC FISHERY
INVESTIGATIONS

FISHERY LEAFLET 390
FISH AND WILDLIFE SERVICE
United States Department of the Interior
Washington, D.C.



United States Department of the Interior, Oscar L. Chapman, Secretary
Fish and Wildlife Service, Albert M. Day, Director

Fishery Leaflet 390

Washington 25, D. C. March 1951

FISHERY RESOURCES OF TURKEY 1/

Contents

Cover: The Bosphorus, connecting the Black Sea and Sea of Marmara. Several species of migratory fish pass through the Bosphorus to go and spawn in the Black Sea in the spring and then return to the Sea of Marmara, and the Aegean and Mediterranean Seas in the autumn.

	Page
Introduction	2
Principal Species of Migratory Fish	4
Pelamid and Bonito	4
Mode of Fishing	4
Processing, Sale, and Consumption	8
Mackerel	15
Mode of Fishing	15
Processing, Sale, and Consumption	15
Bluefin Tuna	15
Mode of Fishing	16
Processing, Sale, and Consumption	16
Anchovy	16
Mode of Fishing	16
Processing and Sale	16
Pilchard	17
Swordfish	17
Spanish Mackerel	17
Dolphin	17
Common Bass and Red Mullet	18
Principal Species of Freshwater Fish	18
Carp	18
Grey Mullet	18
Sturgeon	19
Wells	19
Pike	19

1/ The information in this leaflet was supplied by Miss Bertha Carp, American Consulate General, Istanbul, Turkey (Reports 32 and 63, dated April 7 and May 31, 1949, respectively.) Some additional data were supplied by the Branch of Commercial Fisheries, Fish and Wildlife Service.

Contents (continued)

	Page
Fish Landings	19
Exports	22
Fishing Vessels	22
Employment	22
Cold Storage	28
Canneries	28
Summary of Principal Laws and Regulations Pertaining to Fishing	28
Some Observations on Turkish Fishing and Suggestions for Developing the Turkish Fishing Industry	29

Introduction

The coastal area of the Istanbul region is a very rich fishing ground, the most important in Turkey, although fish are caught all along the long Turkish coastline (Figure 1). This region owes its great abundance of fish to the seasonal migration of certain species of fish which pass through the Bosphorus on their way to spawn in the Black Sea in the spring and their later return to the Aegean and Mediterranean Seas in the autumn with the approach of cold weather. This passage of fish through the straits at regular intervals has, since time immemorial, made it possible to obtain an abundance of fish without much effort. The general direction followed by migratory fish in the spring is from the Aegean and Marmara Seas through the Bosphorus towards the northeast coast of the Black Sea.

The Turkish fishing industry, which is centered in the Sea of Marmara and the Bosphorus, is but the continuation of fishing as practiced by the Greeks in this region as well as in the Golden Horn in ancient times. It is known that the Byzantines fished the bluefin tuna at the entrance of the Bosphorus. The importance given to this species is illustrated by the fact that on certain Byzantine coins there is found a design of the bluefin tuna.

With the passing of time, a certain amount of evolution naturally has occurred in the type of fishing equipment employed. However, basically, changes have been slight. With regard to the evolution in fishing equipment, it is only during the last two centuries that changes have occurred, and this again, only with regard to fishing in the region of Istanbul.

In the coastal regions located far from Istanbul fishing in general is practiced on a small scale for the purpose of meeting local requirements, except for certain species of fish which at certain seasons can be salted or dried in the vicinity of the fishing grounds.

The slogan of Turkish fishermen until recently was "Fish, but do not lose sight of the minarets of Istanbul". This slogan, which

FIGURE 1. THE CHIEF FISHING REGIONS OF TURKEY. MOST OF THE SPECIES FOUND IN THE BLACK SEA ARE ALSO FOUND IN THE SEA OF MARMARA AT SOME TIME DURING THE YEAR. TUNA MIGRATE FROM THE MEDITERRANEAN INTO THE SEA OF MARMARA FROM WHENCE THEY ENTER THE BLACK SEA.

illustrates the attitude of the Turkish fishing industry, has not been entirely forgotten because of the inadequate fishing and transportation facilities available.

The introduction of cotton yarn during the 19th and present century instead of hemp which was previously employed made possible the use of larger nets as the former product is lighter. Consequently, nets made of this commodity are more easily handled, particularly in bad weather or in places where there are swift currents. This change constitutes the most important improvement which has occurred along with the use of motor boats for towing rowboats to the fishing grounds.

Principal Species of Migratory Fish

The most important species of fish caught in Turkey are the migratory species, the pelamid, bonito, mackerel, bluefin tuna, anchovy, pilchard, Spanish mackerel, and swordfish (Figure 2). The importance of these fish from the economic point of view is in the fact that, in addition to their being consumed in the Turkish territory, they are also exported fresh, salted, smoked or canned. In addition to the species listed above, Turkish waters produce an infinite variety of fish which are all consumed locally.

As mentioned above, it is the Istanbul region (Bosphorus and Sea of Marmara) which constitutes the most important fishing area in Turkey. On the basis of estimates, it can safely be assumed that 70 percent of the total amount of fish produced in this country is obtained from waters in this region.

Pelamid and bonito

The pelamid spawns during the months of June and July, and by September or October it acquires a weight of 500 to 700 grams. Migration of pelamid from the places of spawning in the Black Sea to the northeast coast of the Sea of Marmara starts towards the beginning of September with fish moving in the south and southwest direction. Passage of schools of pelamid through the Bosphorus and the Sea of Marmara, west coast, usually continues to early December. During this period the fish is fat and pleasant to the taste, while in the spring when the fish is migrating towards the spawning region it is lean and suitable only for salting and canning. The same applies to the skipjack or large bonito. In the case of the bonito, migration from the Black Sea begins towards the middle of October and continues for a period of approximately one month. As a matter of interest it may be mentioned that pelamids and bonito never mix and that schools of each kind keep apart, the pelamid having a preference for deeper waters.

Mode of Fishing

The pelamid and bonito are fished by fixed nets or traps and by purse seines. Fishing with purse seines is much more productive than fishing with either fixed nets or fish traps. It is effective in the

Figure 2.--CHECK LIST OF TURKISH FISH AND SHELLFISH

English Name	Turkish Name	Scientific Name
Salt water fish		
Pelamid or small bonito	Palamut baligi	Sarda sarda (Pelamys sarda)
Skipjack or large bonito (stripes on belly)	Torik "	Katsuwonus pelamis (Thynnus pelamis)
Sword-fish	Kilic "	Xiphias gladius
Bluefin tuna	Orkinos "	Thunnus thynnus
Mackerel	Iskumru "	Scomber scomber
Spanish mackerel	Kolyos "	Scomber colias
Blue fish (Shmapper)	Lüfer	Pomatomus saltatrix
Scad, horse mackerel	Istavrid "	Caranx trachurus
Anchovy	Hamzi "	Engraulis encrasicolus
Pilchard	Sardelya "	Clupea pilchardus
Gurnard	Kurlangic "	Trigla gurnardus
Sea scorpion	Iskorpit "	Scorpaena porcus
Sea perch	Hani "	Serranus scriba
Red surmullet	Barbunia "	Mullus barbatus
Striped surmullet	Tekir "	Mullus surmuletus
Base	Karagöz "	Sargus rondeletii
Poor capelan (whiting)	Mezit "	Gadus minutus
Bearded rockling (sea Loche)	Gelincik "	Motella vulgaris
Bass (common)	Levrek "	Labrax labrax
Mendole (cackerel)	Ismarit "	Maena vulgaris
Pickerel	Strongilez "	Smaris vulgaris
Spanish sea bream	Mercan "	Pagellus erythrinus

Figure 2.--(Continued)

English Name	Turkish Name	Scientific Name
Sea-bream (Breige becker)	Sinagrid baligi	Pagrus vulgaris
Sand smelt	Gümüs "	Atherina presbyter
Hornfish; Gar-fish	Zargana "	Belone belone
Brill	Civisiz Kalkan baligi	Scophalmus rhombus loevis
Turbot	Kalkan baligi	Rhombus maximus
Dab	Pissi "	Pleuronectes limanda
Common sole (Slip)	Dil "	Solea vulgaris
Thornback (Ray)	Vatoz "	Raia clavata
Herring	Istrongilo "	Clupea harengus
Fresh water fish		
Sturgeon	Mersin baligi	Acipenser sturio
Shad	Tirsi "	Alosa alosa
Eel	Yilan "	Angiulla vulgaris
Grey mullet	Has Kefal "	Mugil cephalus
Brown trout	Aala "	Salmo trutta
Carp	Sazan "	Cyprinus carpio
Bream	Capak	Abramis brama
Chub	Tatli Su Kefal baligi	Leuciscus cephalus
Perch	Tatli Su Levrek baligi	Perca fluviatilis
Pike-perch	Uzun Levrek baligi	Lucioperca sandra
Wels	Yayin baligi	Siluris glanis
Pike	Turna "	Esox lucius

Figure 2.--(Continued)

English Name	Turkish Name	Scientific Name
Rudd	Kizil Kanat baligi	Scardinius erythrophthalmus
Bleak	Inci Levrek	Alburnus lucidus
Bleak (black spotted)	Inci "	Alburnus bipunctatus
Shellfish		
Oyster	Istridye	Ostrea edulis
Limpet (snail)	Tarak	Patella caerulea
Lobster	Istakoz	Homarus gammarus
Langouste (spiny lobster)	Bocek	Palinurus clephas
Spider crab	Ayna	Maja squinada
Mussel	Midye	Mytilus galloprovincialis
Shrimp	Karides	Cragon crangon

Source: Consular Report No. 63, Istanbul, Turkey, July 21, 1949, Smithsonian Institution, and U. S. Fish and Wildlife Service.

pursuit of schools of fish which may be encountered in depths up to 20 or 30 fathoms during the migration period. This net is composed of two lengths of about 150 fathoms each which are joined together. The depth of the net is from 25 to 35 fathoms. Each length is put aboard a large row boat with six oarsmen. On the bottom bolt-rope, which is weighted with lead, are attached numerous metal rings of a diameter of 15 centimeters, through which is passed a rope of which one end is in each of the two boats. The boats, towed by a motor boat, move to the head of the advancing school of fish and start setting the net while each boat advances in a direction opposed to the other one, forming each a semi-circle around the fish and when the boats get close to each other again the surrounding of the fish has been accomplished. Then the rope passing through the rings is pulled by each boat, thus closing the net at the bottom.

Since 1936 this type of net has been used for catching inactive pelamid and bonito at depths of 40 to 50 fathoms by employing an innovation which consists of a powerful electric lamp attached to a battery lowered into the sea by insulated cable. This lamp is lit immediately after the surrounding movement has been accomplished so as to oblige the fish to attempt to escape by going upwards instead of going towards the bottom, and allow the necessary time for the closing of the lower part of the net.

The fish traps used to catch pelamid and bonito consist of a large parallelogram of nets usually 20 to 30 fathoms wide and 100 to 110 fathoms long, closed at the bottom to form a large pocket. The parallelogram of nets is held in place by poles fixed to the bottom of the sea and further strengthened by cables attached to anchors. Outside the parallelogram another straight large-mesh net joins the trap to the coast barring the passage of fish between the trap and the coast. By means of blocks, a 30 fathom length of one side of the net forming the parallelogram is lowered to the bottom leaving an entrance for the fish. Two other nets, each on board a row boat placed at either side of the entrance, are used to surround the schools which may be hesitating to enter the trap.

Processing, Sale, and Consumption

Pelamids and bonito are consumed locally or exported fresh, salted, canned or smoked. Usually, it is the fish in the autumn and winter that are processed. Fish caught during the spring season are consumed fresh or may be canned, since the fish are lean during this season.

Trade estimates place the amount of bonito and pelamid which were salted during the year 1948 at about 120 tons. This figure is much lower than that of the war years when the abundance of fish and demand from foreign countries allowed the salting of 2,000 metric tons in one year.

Exports of pelamid and bonito during 1948 are said to have amounted to almost 90 percent of the total amount fished. The bulk of exports being in the fresh form, the amount smoked barely reaches 50 tons annually and is entirely consumed locally.

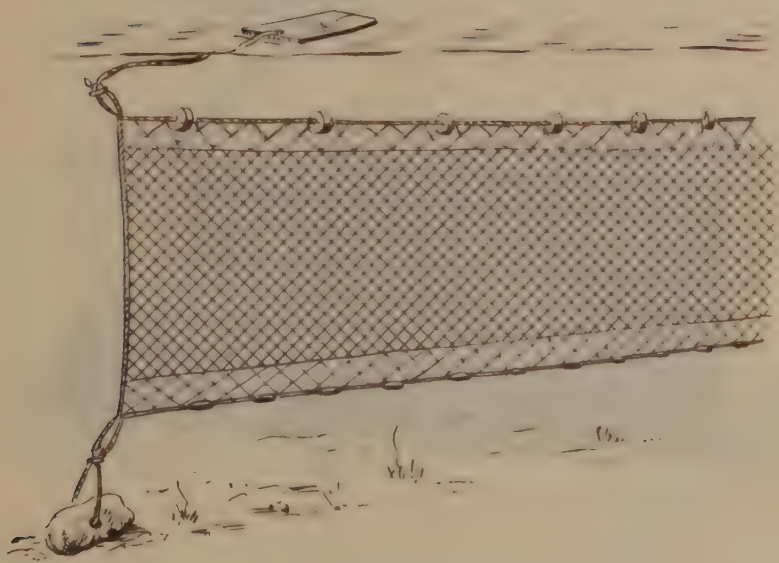


FIGURE 3. SECTION OF GILL NET. GILL NETS ARE DESIGNED TO CATCH FISH BY THE GILLS AS THEY SWIM INTO A NET, AND, IN AN EFFORT TO ESCAPE, ENTANGLE THEMSELVES IN THE MESHES. SIZE OF THE MESH VARIES ACCORDING TO THE SIZE OF THE FISH THE NET IS EMPLOYED TO CATCH. GILL NETS ARE USUALLY STAKED OR ANCHORED IN PLACE, BUT MAY BE SUSPENDED AT THE WATER'S SURFACE OR SUBMERGED.

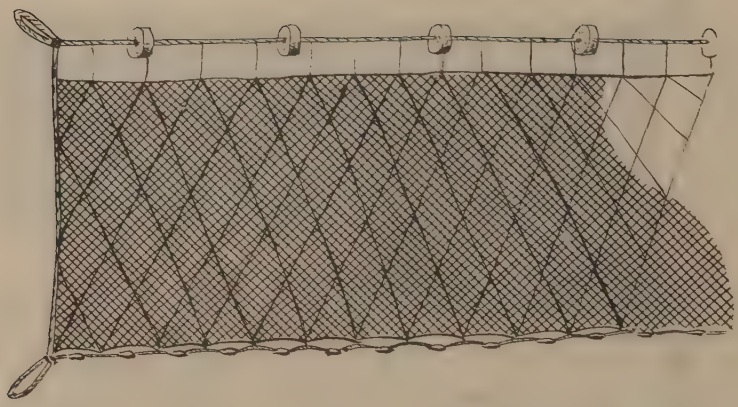


FIGURE 4. SECTION OF TRAMMEL NET. TRAMMEL NETS ARE MADE BY HANGING THREE WEBS TO A SINGLE TOP AND BOTTOM LINE. THERE ARE TWO WEBS OR WALLS AND AN INSIDE WEB. THE OUTSIDE WEBS CONSIST OF LARGE MESHES, 8 TO 10 INCHES SQUARE. THE INSIDE WEB HAS SMALLER MESHES, DEPENDING ON THE SIZE OF THE FISH TO BE CAUGHT. TRAMMEL NETS ARE FISHED BY SETTING OR DRIFTING. WHEN SET, THE NET IS RUN AROUND A SCHOOL OF FISH, LEAVING ONE END CLOSE TO SHORE AND RUNNING THE OTHER END OUT INTO DEEP WATER AND AROUND THE SCHOOL. THE FISHERMEN THEN FRIGHTEN THE FISH INTO THE NET. THE FISH GO THROUGH THE FIRST OUTSIDE MESH OR WALL, THEN STRIKE THE INSIDE WEB, AND PUSH THROUGH THE OTHER OUTSIDE MESH, FORMING A POCKET WHICH HOLDS THE FISH. WHEN NETS ARE DRIFTED, THEY FLOAT ALONG WITH THE CURRENT AND FISH THAT ARE WORKING UPSTREAM HIT THE NET AND POCKET.

FIGURE 5. LARGE FIXED FISH TRAP COMMONLY USED IN THE BOSPHORUS WITH LOOKOUT MAST. TRAP CONSISTS OF A LEAD OR FENCE CONNECTED WITH THE SHORE WHICH DIRECTS THE FISH INTO THE TRAP. ANCHORED PILES HOLD THE NETTING FORMING THE TRAP AND THE LEAD. FISH ARE CONCENTRATED IN A CORNER OF THE TRAP FROM WHICH THEY ARE BRAILED.

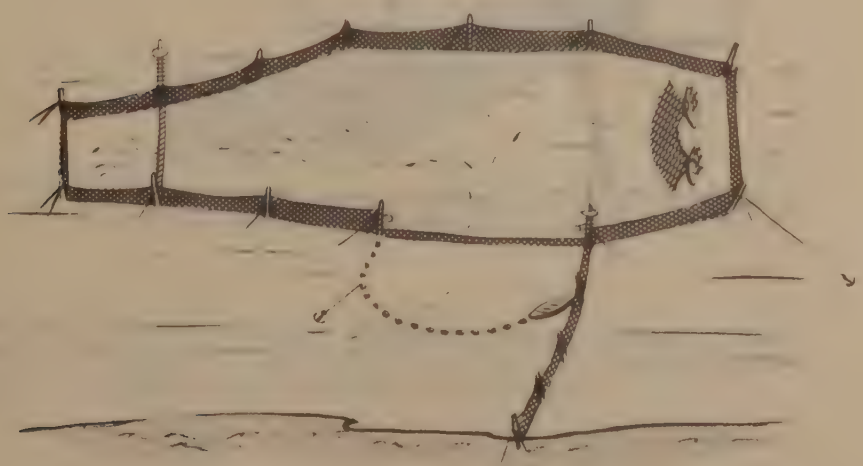


FIGURE 6. LARGE FIXED FISH TRAP COMMONLY USED IN THE SEA OF MARMARA WITH LOOKOUT MAST.

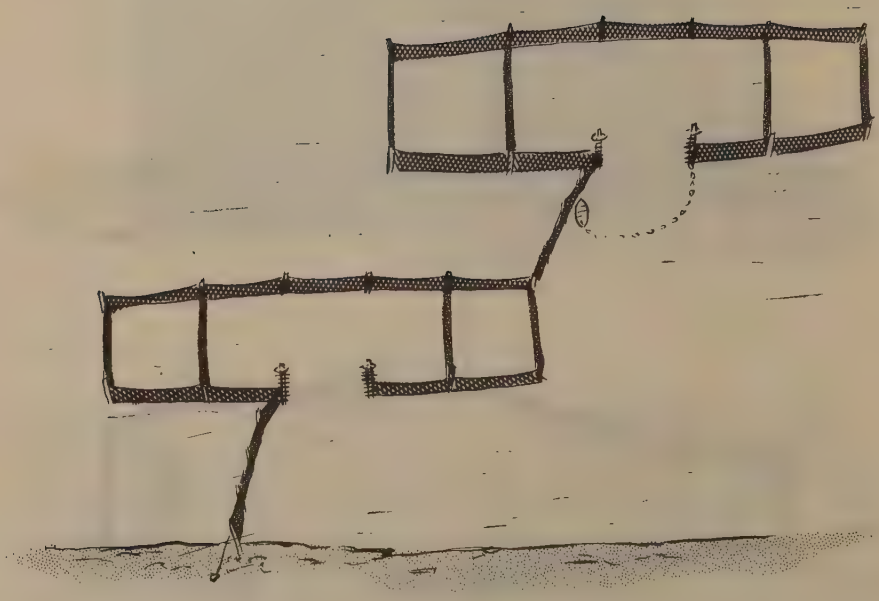


FIGURE 7. DOUBLE FISH TRAP DESIGNED TO TRAP THOSE FISH THAT ELUDE THE FIRST TRAP.

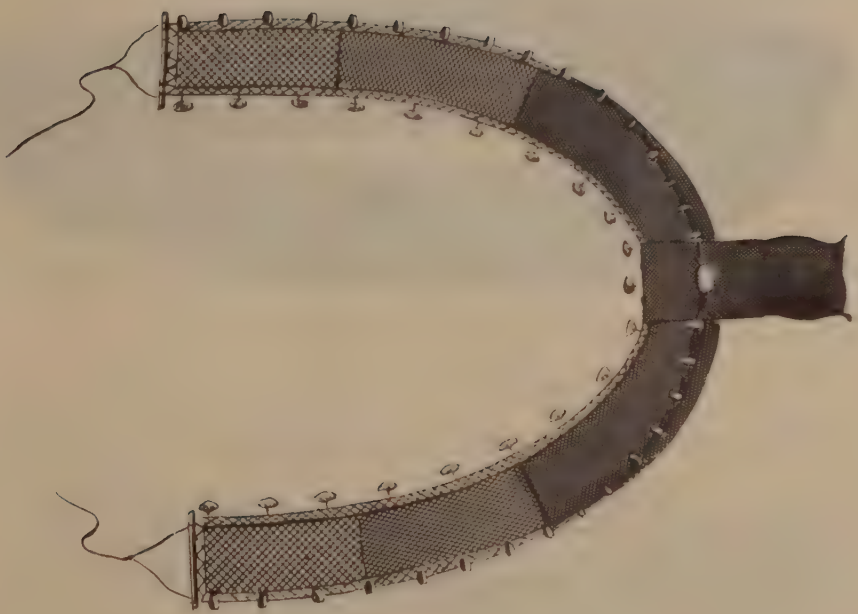


FIGURE 8. BEACH SEINE. ONE END OF THE SEINE IS HELD ON THE BEACH WHILE A BOAT CARRYING THE NET CIRCLES AROUND THE FISH AND COMES BACK TO SHORE. THE NET IS THEN HAULED MANUALLY TO SHORE.

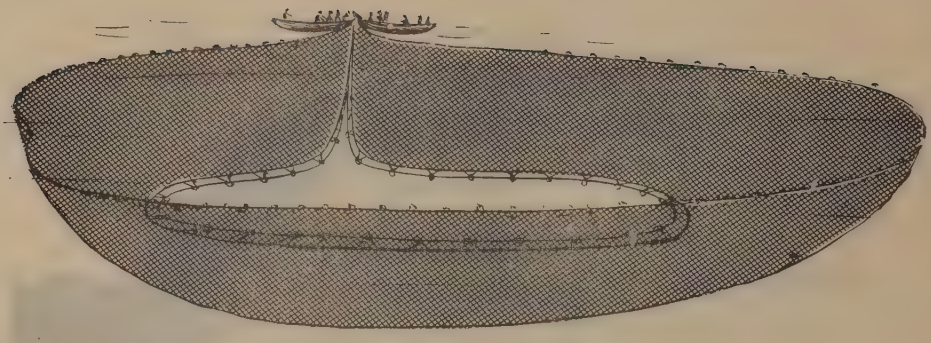


FIGURE 9. PURSE SEINE. A LARGE ENCIRCLING NET SUPPORTED BY FLOATS AT THE SURFACE AND WEIGHTED BY LEADS AT THE BOTTOM. A PURSE-LINE WHICH RUNS THROUGH RINGS ATTACHED BY ROPE BRIDLES AT VARYING INTERVALS TO THE LEAD LINE, IS THE DEVICE BY WHICH THE NET IS CLOSED AFTER THE SEINE IS CAST IN A CIRCLE AROUND A SCHOOL OF FISH.

Mackerel

The mackerel migrates from the Black Sea after the first fortnight of November and hibernates in the Sea of Marmara from whence it returns to the Black Sea in the spring for spawning. In some years it is caught in abundance in the Bosphorus. This happens when the Bosphorus is free from pelamids and bonito which are its principal enemies or when there are strong north winds.

Mode of Fishing

The mackerel is caught with purse seines and in traps. It is caught also with beach seines. One end of the beach seine is attached to the shore while the seine itself is set from a rowboat which circles the school of mackerel as the net is set. When the boat returns to the shore, a rope attached to the other end of the net is brought ashore, thus completing the surrounding of the fish.

Processing, Sale, and Consumption

Mackerel caught during the late autumn and winter is processed in the same manner as bonito, except that it is not canned. Fish caught in the spring is for the most part dry salted.

Total production for 1948 has been estimated as follows:

Salted - 600 tons

Fresh - 200 tons

There have been years when the amount of mackerel salted has reached 2,000 tons.

Bluefin tuna

The bluefin tuna starts migrating from the Sea of Marmara to the Black Sea in the early spring and continues to the end of April. The migratory movement in this direction is again resumed at the beginning of July and lasts for a period of about one month. It is during this last period that the tuna is most abundant in Turkish waters. Quite often large schools of young tuna weighing 20 to 30 kilograms are observed in the Sea of Marmara heading for the Black Sea. Tuna is also abundant in the vicinity of Çeşme, Bodrum, and the Gulf of Mersina.

The migration of the bluefin tuna along the Turkish coasts is in general the continuation of their voyage from the Atlantic Ocean, through the Mediterranean, Aegean, and Marmara Seas towards the Black and Azov Seas, a distance of some 2800 miles (Gibraltar to Azov Sea) from where they start returning to their starting point towards the end of November. The fish, when traveling in either direction, is said to keep the coast to its right.

Mode of Fishing

Fishing for tuna in the autumn and winter is by means of harpoons. Fish traps installed along the Bosphorus are not suited to catching this fish. In the spring and during July some fish traps along the European and Asiatic coasts of the Sea of Marmara catch amounts varying between 250 and 350 tons. These fish traps, although installed at hundreds of fathoms from the coast, are in reality not in the course of the migrating tuna. Tuna caught in these traps are those which have abandoned the regular course while searching to find their way into the Bosphorus. For this reason, only an insignificant fraction of the migrating tuna are caught in Turkish waters.

Processing, Sale, and Consumption

Although this fish is excellent for canning, local plants are unable to process it in a way which can even remotely compare with canned tuna prepared in other countries; therefore, for the present, the bulk of export sales is in the fresh form. Local consumption of fresh tuna in Turkey has been limited to the poorer classes as it has always been sold at extremely low prices in comparison with other fish. This is due to the absence of cold storage facilities which does not allow producers to keep this fish for export or local consumption. Since 1938 when two cold storage warehouses were installed, equipped with freezing chambers, sales have increased in volume; however, only a small number of exporters have access to these installations.

Anchovy

Anchovies descend from the Black Sea towards the middle of December, and substantial amounts are caught during their migration in some years. They ascend to the Black Sea towards the month of March. They are fished for the most part in the Bosphorus and the region of Sinop and the Black Sea.

Mode of Fishing

Anchovies are caught in small-meshed purse seines.

Processing and Sale

No data are available showing production of anchovies along the Black Sea coast; however, most of the anchovies caught in that region are consumed fresh. The trade estimates the average production of salted anchovies at 250 tons per year. In addition, there is an annual production of about 120,000 tubes of anchovy paste, each containing 60 grams. Tubes employed in this industry are imported mainly from Italy and Czechoslovakia. Anchovy paste has not been shipped abroad up to the present time.

Trade circles estimate exports of salted anchovies at 50 tons for the year 1948. Exports of salted anchovy, which used to be made in

wooden barrels without any processing other than salting and packing, have recently been made in tin containers holding 6 kilograms after the heads have been removed, a method of packing preferred by foreign buyers.

Pilchard

Pilchards migrate into the Sea of Marmara from the Mediterranean in May, after spawning in April, and usually do not go beyond the Bosphorus.

Pilchards are caught in purse seines and fish traps and at night with the use of a light.

Annual production varies between 400 and 450 tons, of which about 70 percent is salted, 10 percent canned, and 20 percent consumed fresh.

Swordfish

Swordfish migrate to the Black Sea in April and return to the Bosphorus and Sea of Marmara from about the middle of August to the end of November. It is caught occasionally at other times of the year.

Swordfish are caught in gill nets on moonless nights, and during recent years have been hunted with harpoon guns. The taking of very young swordfish (less than 10 kilograms) is prohibited.

Average annual production of swordfish does not exceed 300 tons, most of which is consumed fresh, less than 15 percent being smoked.

Spanish mackerel

Spanish mackerel start migrating from the Mediterranean at the beginning of May and reaches the Bosphorus, possibly penetrating into the Black Sea, from whence it starts returning towards the Mediterranean in August. The principal fishing regions are the Bosphorus and more particularly the waters about the islands in the Sea of Marmara. Method of fishing for Spanish mackerel is the same as for mackerel. Production is estimated at about 500 tons, of which almost 85 percent is exported fresh while 10 percent is consumed fresh locally and 5 percent is salted. In addition, an estimated 70 tons of young Spanish mackerel are taken in the Sea of Marmara, salted and consumed in the domestic market.

Dolphin

The dolphin (mammal) is taken in the Sea of Marmara and the Bosphorus on a small scale and in large quantities along the Black Sea Coast. It is used for the extraction of oil which in part is consumed locally. Annual production of dolphin oil is estimated at from 600 to 700 tons. The flesh of this mammal is said to be inedible. There exists one more or less modern plant in Trabzon which extracts dolphin oil, while a substantial amount of oil is also obtained by primitive methods of processing by groups of fishermen on the shores of the Black Sea and other fishing regions.

During the war years the principal foreign buyer was Germany, while at present Italy is the principal export outlet.

Common bass and red mullet

An infinite variety of edible fish are caught in Turkish waters. In addition to the principal species discussed above, the ones that have a certain importance, as they are exported from ports on the Aegean Sea, are the common bass and red mullet.

Principal Species of Freshwater Fish

The principal species of freshwater fish caught in Turkey are the carp, grey mullet, wells, pike, eels, and sturgeon.

The principal lakes producing freshwater fish are the Apolyont, Manyas, Akşehir, Mermercik, Enez, Kullak, Beyşehir, Söke, and Terkos. These lakes are especially rich in carp. The potential output of Turkish lakes and streams is estimated at over 3,000 tons per annum, of which two-thirds would represent carp.

At present only a fraction of the country's potential freshwater resource is being utilized, and this only to the extent that sales outlets can be secured for the fish caught. The lakes of Mermercik, Söke, and Bafra are rich in grey mullet. Lakes and streams in the Iskenderun region abound in grey mullets and eels, but fishing in this part of the country is of limited commercial importance.

Eel fishing all over the country may be considered as having received practically no attention because the type of equipment required for this fish is not sufficiently well known in Turkey. Fishing for freshwater fish is usually practiced by means of traps made of rushes installed in such a way that once the fish gets in it finds it difficult to find its way out. Nets are also used to a limited extent.

Carp

Annual production of carp is estimated at from 1200 to 1500 tons. The fish itself is consumed in the regions where it is caught after extraction of the roe, which constitutes an important export commodity. This product is salted in a primitive fashion and packed in tin cans which are shipped to Istanbul for further processing with a view to export and domestic consumption. Average annual production of carp roe according to trade circles approximates 60 tons.

Grey mullet

Annual production of grey mullet is estimated at 500 tons of which about 50 percent is exported fresh. The balance is consumed locally in either the fresh or smoked form. This fish also serves for the production of botargo (pickled spawn) which is usually sold coated with beeswax. Annual production of this commodity which is highly prized is estimated

at 10 tons of which 6 tons are obtained during the summer season and 4 tons during the winter season. Of the summer production 10 percent is consumed fresh.

Sturgeon

Sturgeon fishing is most important at the mouths of the rivers flowing into the Black Sea. At the mouth of the Kizil Irmak (In Bafra) some 18 tons of fish are caught annually. At the mouth of the Yeşil Irmak (Çarşamba) another 16 tons of sturgeon are caught annually. The Sakarya River yields about 8 tons of sturgeon annually. From this total amount of sturgeon caught, from 4 to 4½ tons of black caviar are produced.

Wells

The fish known as wells abounds in lakes and streams in the vicinity of Istanbul such as the Terkos and Sapanca Lakes. It is also fished in the Apolyont, Iznik, Akgöl Lakes and the Kizil Irmak, Yesil Irmak, Tunca, and Menderes Rivers. It often reaches a weight of 150 kilograms. The fish is not suited to salting and in normal circumstances is exported fresh on a fairly large scale, mainly to Bulgaria. It is also consumed locally.

Pike

Pike is fished in the same districts as wells. Only a very small percentage of the catch of pike is consumed fresh locally. The bulk of the fish caught and its spawn are salted and normally exported to Rumania, Bulgaria, Greece, and Syria.

In addition to the few species of freshwater fish mentioned above, there is an almost infinite variety of fish which abound in the lakes, rivers, and streams all over the Turkish territory. However, these fishery resources are practically unused because of the lack of transportation facilities and the fact that the regions in which most of these lakes are located or through which the rivers flow are not densely enough populated.

Among Turkish lakes the Van Lake and other lakes in the province of Van are particularly worthy of mention. These lakes are very rich in fish but the species which is most abundant is the bleak. Samples of various fish from the Van Lake were brought to Istanbul for the purpose of interesting firms dealing in this commodity, and although military circles found most of these fish were satisfactory with regard to quality, the absolute lack of storage and other facilities and the great distance to large-scale sales outlets condemns fish from this region to be left unused on a commercial basis for the present.

Fish Landings

There are no published statistics of the total production of fish by Turkish fisheries. Estimates of this production are based on

records of fish marketed through the Public Fish Auction in Istanbul and estimates of Government fisheries people and members of the fishing industry. In 1944, the annual production was estimated at from 35 to 40 thousand metric tons, and it was considered that an annual catch of 200,000 tons is possible with modern equipment (not yet in use, 1950). Fish landings, presumably for the Istanbul region, for the fishing year 1944-45 was estimated at 17,900 metric tons. 2/ The Istanbul region is believed to account for from 70 to 80 percent of the total annual fish catch of Turkey. The Committee of European Economic Cooperation 3/ estimates production of fish for Turkey as shown below. Production figures are annual averages for the indicated periods.

Period	Landings (Metric Tons)
1934-38	22,000
1945-46	18,000
1946-47	21,000
1947-48	40,000
1948-49	70,000
1949-50	100,000
1950-51	125,000

Total landings of fish in Turkey in 1938 were estimated at 115,000 metric tons. 4/

Considering all available information, it seems that the annual catch must range from around 20,000 to 40 or 50 thousand tons.

The quantities of fish sold on the Istanbul Fish Exchange for two prewar and two postwar years, are shown in Figure 10.

2/ Consular Report No. 119, Ankara, Dec. 29, 1945, Food Supplies in Turkey.

3/ The CEEC, Vol. II, Technical Reports, Dept. of State, July-Sept. 1947.

4/ Report of R. H. Fiedler, Economic Cooperation Administration, following his trip to Turkey, April 18 to May 2, 1949.

Figure 10.--QUANTITY OF FISH SOLD BY AUCTION AT THE ISTANBUL FISH EXCHANGE, 1938, 1939, 1947 AND 1948.

Species	Unit	1938	1939	1947	1948
Pelamid	Pairs	2,429,810	1,239,382	3,781,562	1,063,360
Bonito	Pairs	2,824,989	4,925,922	320,302	243,965
Lobster & Spiny Lobster	Units	66,967	81,654	78,891	21,283
Mollusks	Containers of about 0.25 cubic meters	2,149	3,405	4,071	2,060
Surmullet, red & grey; grey mullet, mackerel, anchovy, Spanish mackerel, pilchards	Kilograms	3,984,353	4,918,588	3,965,791	6,429,447

Exports

Export sales of fresh fish on a relatively large scale for Turkey started only recently, in 1930, with Greece as the principal purchasing country. The Italian market started taking an interest in fresh fish from Turkey in 1933. Czech and German purchases began in 1938 - 39.

The principal outlet for salted fish has always been Greece, followed by Rumania and Bulgaria, the last mentioned country constituting a market of secondary importance. As far as canned fish is concerned it was only during the war years that exports attained a relatively important volume.

Export figures obtained from official Turkish export statistics for the years 1939, 1940, and 1942 to 1947, are shown in Figure 11. Variations in amounts exported over the different years are explained by the fact that during the years preceding the war up to 1941 there was an unusual abundance of fish, while the amount of fish caught up to 1945 was fairly abundant and since 1946 a continuously increasing scarcity of fish became apparent. The sudden reduction in exports in 1945 is to be attributed to the loss of the German market as a result of the break in relations between Turkey and that country.

Fishing Vessels

Fishing, with regard to vessels, is based on rowboats. As previously mentioned, motor boats serve mainly for transportation. In recent years some of the row boats have been equipped with powered motors. The estimated number of fishing vessels operating in Turkish waters are shown in Figure 12.

In addition to the above enumerated fishing vessels, it is esti mated that there exist from 2300 to 2500 rowboats equipped with one or two pairs of oars, which are used by small fishermen and amateurs for fishing as well as for numerous other purposes when not needed for fishing, such as carrying small amounts of cargo, passengers, and pleasure boating.

Employment

It is difficult to estimate the number of workers employed in the fishing industry, since fishing does not constitute a regular occupation for a great number of fishermen, who will temporarily give up fishing when there is a shortage of fish, or when they can get a better remunerated job. In the case of workers employed in the processing of fish, similar conditions prevail coupled with the fact that there exist no canning plants packing fish only. Employment in the fishing industry is estimated as follows:

a) On fishing vessels, fish boats and fish traps - 25,000 - 30,000

b) On land (processing, salting, drying, packing etc.) - 8,000 - 10,000

Figure 11.--EXPORTS OF FISH AND FISH PRODUCTS, EXCEPT FISH OILS, 1939, 1940 AND 1942-47.

(Metric Tons)

Fish and Fish Products	1939	1940	1942	1943	1944	1945	1946	1947
Pelamid & Bonito - fresh	17,171	21,373	6,356	8,987	7,194	1,501	3,994	2,803
Mackerel - "	0	133	0	0	60	19	155	83
Other fish - "	1,549	1,394	877	873	1,477	1,213	1,625	2,025
Pelamid & Bonito - salted, canned, smoked, dried	1,167	1,302	2,443	5,546	4,726	2,854	2,424	407
Mackerel - salted, pickled, smoked, dried	0	204	150	329	336	164	658	171
Other fish - salted, pickled, smoked, dried	407	620	877	1,397	709	1,411	1,009	463
Canned fish, fish pastes, etc.	238	40	254	627	1,105	489	832	523
Black caviar	*	0	0	*	0	0	*	0
Carp red roe	22	11	9	2	13	34	37	8
Total**	20,554	25,077	10,966	17,761	15,620	7,685	10,734	6,483

Figure 11.--(Continued)

Country of Destination	1939	1940	1942	1943	1944	1945	1946	1947
Iraq	*	0	11	9	0	0	0	0
England	*	*	16	0	0	0	0	0
Germany	246	13	3,938	8,529	9,115	0	0	229
Belgium	2	1	0	0	0	0	15	0
Bulgaria	2,094	2,559	1,895	1,714	1,875	2,079	2,169	547
Czechoslovakia	0	109	198	818	296	0	124	535
France	445	9	0	0	*	0	0	0
Italy	10,294	16,698	2,082	1,809	0	219	937	1,345
Rumania	426	287	117	27	0	0	2	23
Yugoslavia	0	231	0	100	0	0	0	0
Greece	5,872	4,033	958	389	427	1,543	4,739	2,442
Palestine	709	644	1,446	3,647	3,530	3,208	1,870	698
Dodecanese	29	17	92	21	0	8	14	31
Syria	206	382	166	325	255	107	356	354
Switzerland	0	0	0	160	0	0	12	0
Cyprus	4	0	22	96	0	115	93	29
Malta	0	0	0	0	0	0	77	6
Spain	*	0	0	0	0	0	0	0
Egypt	71	16	20	83	92	261	219	30
United States	97	33	0	0	0	118	47	27
Other	61	29	3	14	20	17	10	19
Total**	20,556	25,061	10,964	17,741	15,610	7,675	10,684	6,515

* Less than one ton.
** Discrepancies between totals due to rounding.

Figure 12.--PRINCIPAL TYPES OF FISHING VESSELS

	Number
Motor boats, average load 6 tons, 10-20 h. p., Diesel powered	100
Motor boats, average load 10 tons, 30-50 h. p., Diesel powered	500
Motor boats, average load 20 tons, 80-100 h. p., Diesel powered	50
Row boats, equipped with 1.5 to 12 h. p. Outboard motors	400
Row boats, 3 pairs of oars, (5 m. long, 1.30 m. wide)	80
Row boats, 4 pairs of oars, (7 m. long, 1.40 m. wide)	60
Row boats, 5 pairs of oars, (9 m. long, 1.50 m. wide)	250
Row boats, 6 pairs of oars, (4 m. long, 1.60 m. wide)	50
Lighters used for fishing traps (6-8 ton load, 9-11 m. long, 1.80-2.00 m. wide)	80

FIGURE 13. TYPE OF MOTOR BOATS USED FOR TRANSPORTATION OF FISH AND TOWING OF ROW BOATS.

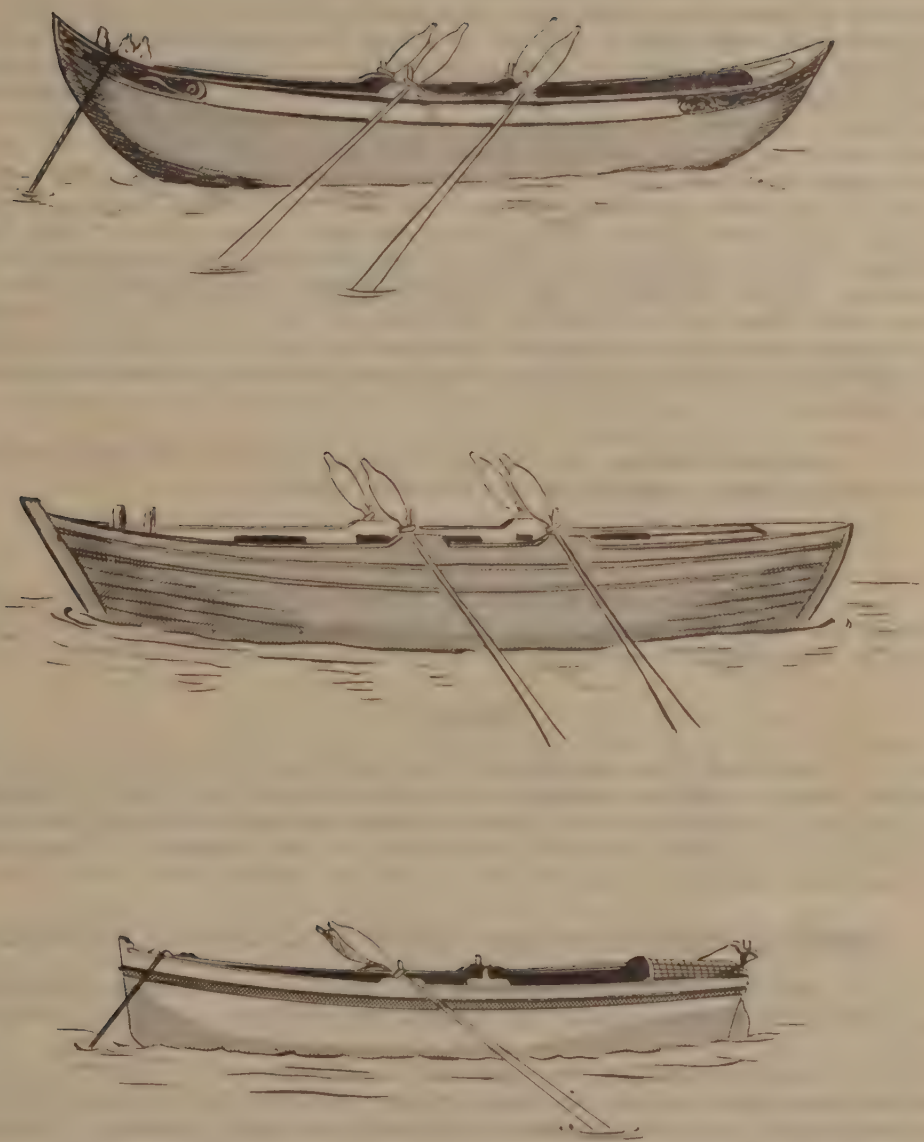


FIGURE 14. STANDARD TYPE OF FISHING BOAT (UPPER). LIGHTER USED IN CONNECTION WITH FISH TRAPS. SOME LIGHTERS ARE EQUIPPED WITH FOUR PAIRS OF OARS (MIDDLE). ORDINARY ROW BOAT USED FOR FISHING AND OTHER PURPOSES (LOWER).

As mentioned above, according to existing legislation all fish caught must be sold by auction at the fish exchanges attached to the Ministry of Commerce. Retailers, processers, restaurants, exporters, etc. purchase their supply of fish at these fish exchanges; consequently, there are no wholesalers of fish distinct from fishermen. The number of retail shops selling fish is placed at about 400 for the whole Turkish territory. However, in addition to these retail outlets there exist a great number of street vendors, among whom are found fishermen who spend their spare time selling fish. It should be mentioned that a very large catch of fish tends automatically to increase the number of fish vendors of this type, usually small fishermen, who avoid the paying of the fixed exchange fees by disposing of their catch by selling it from door to door secretly. It is estimated that from 20 percent to 50 percent of the fish catch other than pelamid, bonito, and tuna is sold in prohibited traffic, i. e. without passing through the fish exchanges. Such contraband sales are most active during the summer season and relatively inactive during the winter.

Amateur fishing for fish, lobsters and other mollusks accounts for a fairly large quantity in the Istanbul area.

Cold Storage

Cold storage space which is either being used or might eventually be used for fish is estimated at 40,000 cubic meters, but part of this space is required and used for the storage of various foodstuffs.

Canneries

Existing food canneries, 7 in number, all located in the Istanbul region, have a combined estimated production capacity of 12,500 kilograms per day on a one 8-hour shift basis. These canneries are not in a position to devote their entire production capacity to the canning of fish, inasmuch as they meet domestic requirements in various canned foods other than fish.

Summary of Principal Laws and Regulations Pertaining to Fishing

All fishermen are required to obtain a fisherman's permit from the provincial authorities at an annual fee of T. L. 1.00 (U. S. $0.35).

All fish caught for commercial purposes is subject to a 12 percent tax levied on the wholesale price obtained by auction under the supervision of officials of the Ministry of National Economy. In large cities the Ministry has organized fish exchanges (balikhane) while in less densely populated areas government inspectors control the collection of this tax.

In the case of fishing concessions obtained from the government on a rent basis pertaining to lakes the tax is considered to have been prepaid with the rent and the 12 percent tax is consequently not paid. Fishing in lakes constituting private property is subject to the 12 percent tax. Fishing ground concessions which remain unused for a period of three

consecutive years revert to the state. However, in instances where military exigencies or a state of war have caused utilization to be discontinued the concession is retained by the concessionaire. The use of explosives, chemicals and other means of fishing which would destroy fish or fish spawn or would have a detrimental effect on the health of consumers is prohibited. The damming of rivers or streams and the changing of direction of same is prohibited by law.

Trawl fishing is prohibited in the Bosphorus and the Sea of Marmara.

Some Observations on Turkish Fishing and Suggestions for Developing the Turkish Fishing Industry

As will be understood from the foregoing, fishing in Turkey has not as yet reached a level where the term fishing industry can be employed. Turkish fishermen continue employing antiquated methods with regard to fishing, while the very limited and inadequate conservation and canning facilities constitute a constant handicap to the development of this industry. With the exception of the use of motor boats for towing fishing boats manned by rowers with the purpose of hauling or catching up with fish, and the transportation of fish caught to the wholesale fish markets, no fishing vessels equipped with modern facilities are employed. It should be observed that the use of motor boats does not imply that fishermen operate at great distances from their point of departure. Trips of any duration are impossible inasmuch as the boats employed are such as not to allow fishermen to remain away from the shore for long periods of time or overnight. Consequently, fishermen in every given region find themselves obliged to await the passage of fish from the vicinity within which they are able to operate with their limited facilities and equipment. By employing modern fishing vessels and equipment, it would be possible to go out and meet the fish and to have much longer fishing seasons for each species of migratory fish.

With regard to satisfactory fishing traps, the relatively large type, 110 fathoms long by 30 fathoms wide constitute barely 10 percent of the total in existence and the balance is of about half this size. These small size fish traps are considered to be most unsatisfactory by the few experienced fishing people in Turkey. The extremely conservative attitude of the bulk of fishermen has constituted the main handicap to the adoption of the larger type fish trap. It should, however, be pointed out that the problem regarding the development of a fishing industry can not be resolved by increasing the catch only. As a matter of fact there have often been years or seasons when fish was so abundant that even with the available primitive means of fishing very large quantities of fish have been caught and have then had to be destroyed after fishermen had despaired of selling them. To avoid having to resort to destroying fish as often happens, at times when the flow of fish persists for long periods of time, fishermen decided to fish only every other day.

The only measures taken up to the present time with regard to developing a fishing industry have been the reduction of sales tax on fish,

which up to 1926 amounted to as much as 24 percent to 12 percent and the establishment in 1930 of an Institute of Ichthyology in the Istanbul area by the government. This last measure, however, was not much of a success. Specialists from Germany, Great Britain, and Estonia, who were brought to Turkey in this connection studied currents and carried on certain icthyological experiments; however, the results obtained by the Institute not having justified the expenses incurred, the Institute was closed in 1937 and no activity along this line has since taken place.

Certain indications of activity with regard to developing the Turkish fish industry are now becoming apparent on the part of private industry through the Fishermen's Association. This organization is basically a sort of union which has as its purpose to safeguard the interests of fishing and fishermen and to make known to the authorities the views and problems of fishermen and the fishing industry. The association is also accumulating a fund by collecting 1 percent of the counter value of sales of fish at the fish exchange. The purpose of this fund is to serve in assisting fishermen in cases of loans or poverty.

The Association at the same time serves as arbitrator in case of differences between fishermen. Recently the Association decided to send four of its members to Italy and the United States so that they could observe fishing methods and modern facilities employed in those countries. The Ministry of Commerce, however, having informed the Association that a specialist from the United States was to come to Turkey shortly, it was decided to await his arrival.

It is estimated that the yield from fishing would be increased tenfold by the adoption of the following measures:

(1) The adoption of modern fishing methods. Motor powered fishing vessels suited to the catching of various kinds of fish must be made available to fishermen.

Modern facilities should be adopted to eliminate use of manpower in hauling nets, loading and unloading fish, etc. Satisfactory fishing vessels should be enlarged and modernized and be installed at much greater distances from the shore than they are at present at places where it is known that fish will pass at given periods. Thus fishermen would cease being reduced to relying on catching only a small portion of migrating fish which may pass close to the shore.

(2) Ensuring fish caught will reach consumers or exporters in a satisfactory state of preservation. For this purpose it would be necessary that fishermen acquire vessels with refrigerated storage space which will enable them to transport the fish caught to places of consumption, processing or export in good condition.

(3) Freezing of fish. Modern refrigeration and freezing facilities are essential. Existing facilities of this type are limited and completely insufficient with regard to meeting requirements even at the present rate of fishing. The same applies to canning installations.

The fresh fish export trade should dispose of non-refrigerated vessels, and acquire vessels equipped with freezing or refrigeration installations of capacities varying between 15 and 150 tons for exportation of fresh fish to nearby countries.

It is believed that it would be to the interest of the Turkish economy to install plants for the processing of fish waste into fish meal and for the extraction of fish oils. At present there exists only one fairly modern plant of this type which was installed by the Germans during the war in Istanbul. The plant has a daily processing capacity of 25 tons of fish waste and can produce according to season 8 percent to 12 percent fish oil, and 20 percent to 22 percent fish meal, which contains 60 percent to 65 percent protein.

Interior--Duplicating Section, Washington, D. C. 93636